

NON-PUBLIC?: N
ACCESSION #: 9309090345
LICENSEE EVENT REPORT (LER)

FACILITY NAME: DONALD C. COOK NUCLEAR PLANT - UNIT 2 PAGE: 1 OF 04

DOCKET NUMBER: 05000316

TITLE: REACTOR TRIP FROM SPURIOUS TURBINE EXHAUST HOOD HIGH
TEMPERATURE TRIP
EVENT DATE: 08/02/93 LER #: 93-007-00 REPORT DATE: 09/01/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 070

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: G. A. WEBER - PLANT ENGINEERING TELEPHONE: (616) 465-5901
SUPERINTENDENT

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: TA COMPONENT: --TS MANUFACTURER: M235
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On August 2, 1993, at 1226 hours, the Unit 2 reactor tripped as a result of a main turbine trip, caused by a spurious actuation of the Exhaust Hood High Temperature Trip Switches. Investigation revealed that eight of nine Exhaust Hood High Temperature Trip Switch setpoints were found to be significantly below the normal trip setpoint. Investigation of the event determined that the method used to calibrate the switches may have caused the setpoint to be misadjusted, and that vibration can cause a downward shift in the setpoint. These factors, combined with a slight increase in hood temperatures and vibration levels which resulted from the removal of a main condenser half from service, are believed to have caused the spurious trip.

To prevent recurrence, the Main Turbine Exhaust Hood high temperature turbine trip was disabled. Written instructions for a manual turbine

trip on receipt of a verified Main Turbine Exhaust Hood Extreme High Temperature Alarm have replaced the defeated automatic trip.

END OF ABSTRACT

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Conditions Prior to Occurrence

Unit 2 was operating in Mode 1 at 70.5 percent of Rated Thermal Power. Condenser 'B' North water box had been removed from service within the previous 15 minutes.

Description of Event

On August 2, 1993, at 1226 hours, the Unit 2 reactor (EIIS/JE) tripped as a result of a Main Turbine (EIIS/TA) Exhaust Hood high temperature trip.

Following the turbine/reactor trip sequence, turbine (EIIS/TA-TRB) trip, opening of the reactor trip breakers (EIIS/JE-BKR), insertion of reactor control rods (EIIS/BA-P), and automatic start of the auxiliary feedwater pumps (EIIS/BA-P)!, Operations personnel immediately implemented Emergency Operating Procedure 2 OHP 4023.E-0 to verify proper response of the automatic protection systems and to assess plant conditions for appropriate recovery actions.

Abnormalities noted during the event included:

Feedwater valves (EIIS/BA-FCV) from the East Motor Driven Auxiliary Feed Pump (EIIS/BA) throttled further than expected after receiving a flow retention signal, requiring operator action to maintain correct flow rates. The Auxiliary Feedwater (AFW) flows from the other motor-driven and turbine-driven pumps were not affected and delivered flow in excess of that required for safety analysis concerns. Flow switches were subsequently recalibrated and flow retention intermediate valve positions were reset.

Main Steam Isolation Valves (EIIS/SB-ISV) started drifting closed following the reactor trip. The valves were promptly reopened. A review of several past trip reports indicates that this is not unusual and is an expected consequence following a trip due to actuator design. No corrective actions are planned.

Cause of Event

The turbine trip was initiated by a spurious actuation of the Turbine

Exhaust Hood High Temperature Switches. Eight of nine switch actuation setpoints were found to be significantly lower than as-left condition recorded in August, 1992 when they were last calibrated.

The investigation of this event found that the calibration accuracy is affected by the ability to position the switch for bench calibration precisely as it will be positioned in the field. Any difference will affect the accuracy of the calibration. Calibration accuracy is also susceptible to the method by which heat is applied to the switch sensing element. The method used in the previous calibration (application of heat using a heat gun) may have allowed a difference to exist between the temperature sensed by the

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Cause of Event (Cont'd)

sensing element of the switch and that sensed by the calibration standard. It was also demonstrated by test that vibration can cause the switch to actuate below its setpoint.

Just 15 minutes prior to the event, cooling water to the "B" North Low Pressure Turbine (LPT) Condenser half was isolated to permit inspection for tube leakage. Removal of a condenser half from service has the effect of increasing hood temperature on the associated LPT and can also increase vibration levels. Although slightly elevated, both vibration and hood temperatures remained well within operating limits. However, the slight increase in these parameters, combined with the lower than normal as-found switch setpoints and the tendency of the switches to actuate prematurely when subjected to vibration, is believed to have caused the spurious trip.

Analysis of Event

This report is being submitted in accordance with 10 CFR 50.73, paragraph (a)(2)(iv), as an event that resulted in an unplanned automatic actuation of the Engineered Safety Features, including the Reactor Protection System.

The automatic protection responses, including reactor trip and its associated actuations were verified to have functioned properly as a result of the reactor trip signal. Feedwater valves from the East Motor Driven Auxiliary Feed Pump, which throttled further than expected, were under the control of the reactor operator, and readjusted as required in accordance with the reactor trip response procedure (E-0). The main

steam isolation valves, which started drifting closed, were reopened promptly. Based on the above, it is concluded that the event did not involve an unreviewed safety question as defined in 10 CFR 50.59(a)(2) nor did it adversely impact the health and safety of the public.

Corrective Actions

A review by AEPSC and ABB personnel determined that the Turbine Exhaust Hood high temperature trip served no safety-related function. The trip had been originally installed as a means of tripping the turbine in the event of generator motoring, to prevent damage to the turbine generator. Following this review, the automatic main turbine trip from high exhaust hood temperature was disabled and replaced with instructions for a manual main turbine trip. On receipt of a Main Turbine Exhaust Hood Extreme High Temperature Alarm, and after verifying the extreme high temperature condition per the revised annunciator response procedure, the operator will trip the turbine.

The calibration method for the Turbine Exhaust Hood high temperature trip has been modified to use a water bath for heat application to provide assurance of a uniform heat medium.

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Corrective Actions (Cont'd)

Balance weights were added to the main turbine during unit startup to reduce vibration levels.

The East Motor Driven Auxiliary Feed Pump flow switches were recalibrated and flow retention intermediate valve positions were reset.

Failed Component Identification

Plant Designation: Low Pressure Turbine Exhaust Hood
Temperature Switch Thermal Sensors
Manufacturer: Mercoid Corp.
Model: DA-37-804-6
EIIS Code: EIIS/TA-TS

Previous Similar Events

None

ATTACHMENT 1 TO 9309090345 PAGE 1 OF 1

Indiana Michigan
Power Company
Cook Nuclear Plant
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Bridgman, MI 49106
616 465 5901

INDIANA
MICHIGAN
POWER

September 1, 1993

United States Nuclear Regulatory Commission
Document Control Desk
Rockville, Maryland 20852

Operating Licenses DPR-74
Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled
Licensee Event Report System, the following report is being submitted:

93-007-00

Sincerely,

A. A. Blind
Plant Manager

/jas

Attachment

c: J. B. Martin, Region III
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